Framework for Analysis of Cosmological Surveys

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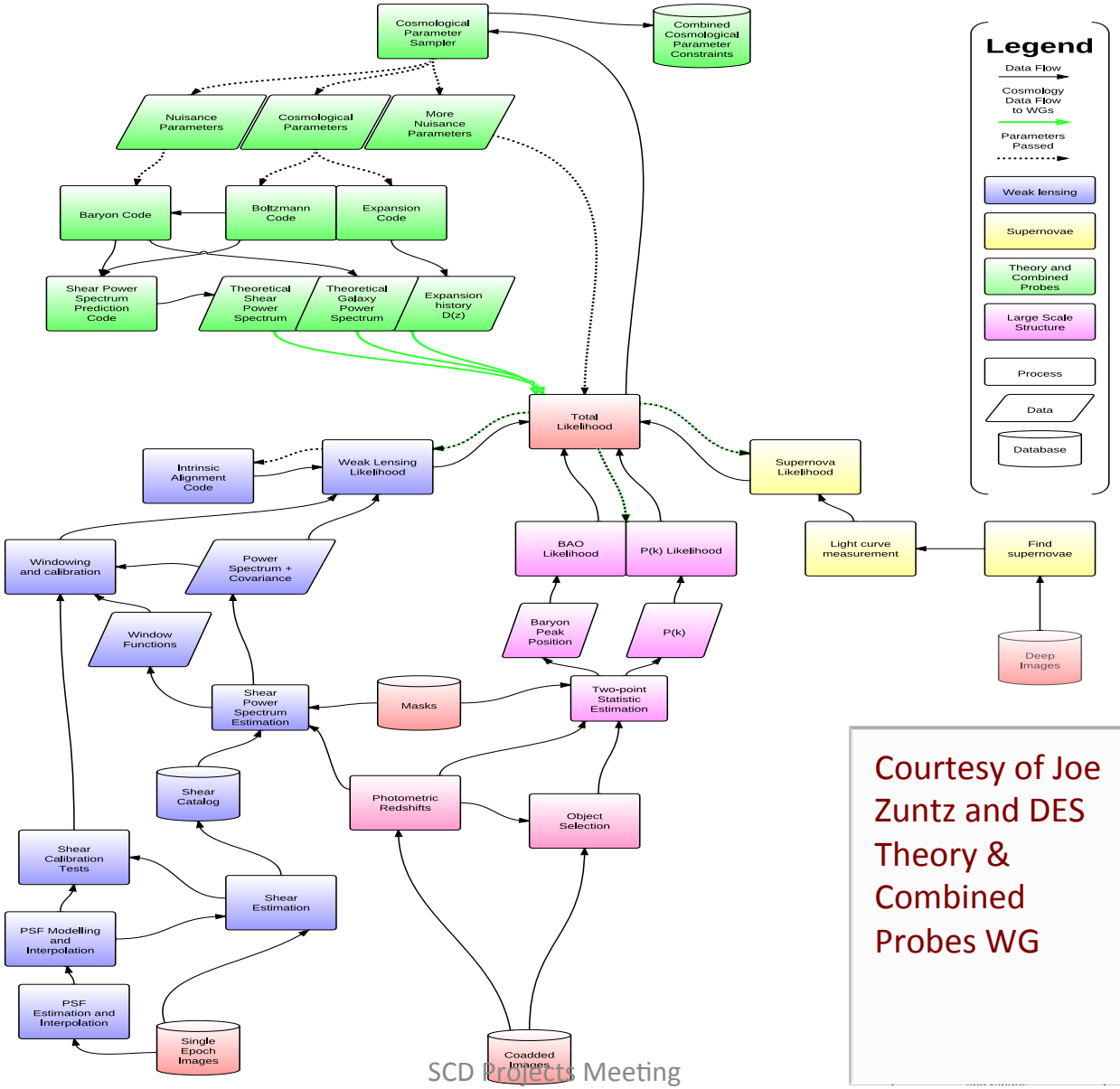
Problem

- The Theory and Combined Probes Working Group identified a need for a shared analysis framework to solve parameter estimation problems involving MCMC.
- Key requirements:
  - Sharing of algorithms, tools, and libraries
  - Permitting substitution of one algorithm for another
  - Chaining tools together
  - Development environment for compiling and testing
  - Shared source code repository
  - Organized tool deployment and release
  - Cataloging of results with associated metadata

Start of a solution

- Joe Zuntz begin an project to solve this problem:
  - Described at http://www.homepages.ucl.ac.uk/~ucapjzu/despes/
  - Repository at https://bitbucket.org/joezuntz/des-pipe
- Excellent start at satisfying the requirements
  - provides a home for contributions
  - Coupling or glue code provided to construct applications
- Presented to the SSI group during summer 2012.
  - We went over a large fraction of the package
  - Planned where to go next with the project

View of the repository



Courtesy of Joe Zuntz and DES Theory & Combined Probes WG

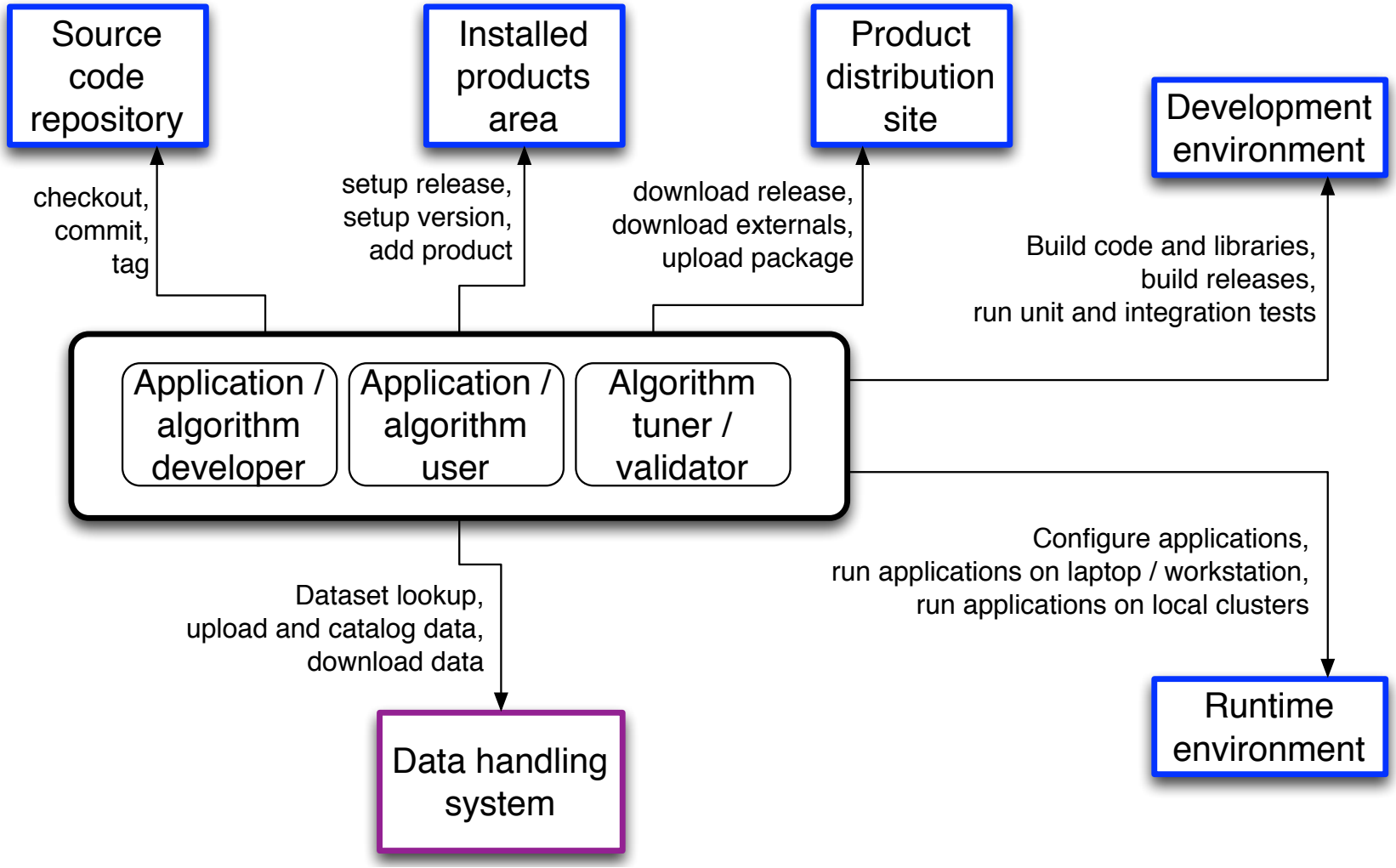
Framework for Analysis of Cosmological Surveys (FACS)

- Scott Dodelson, Marc Paterno, Elizabeth Buckley-Geer, and myself wrote a proposal to further this work
- Proposal submitted to our Computational HEP DOE program manager Lali Chatterjee
- Looks like we are going to be getting .5 FTE to develop a more complete system

Project description

- Excerpt from the proposal: "The pilot project proposed here will provide a software framework for analysis of survey data initially targeted for DES. The scope will be limited to parameter estimation problems needed by the Theory and Combined Probes Working Group involving MCMC. The software framework functionality to be delivered includes a collaborative hierarchical development environment to be used directly by physicists. […] Key objectives of this project include ease of integration, deployment, and operation within existing and proposed cosmic frontier workflow systems and batch environments, along with use on individual scientist's workstations. Reuse of existing tools is essential. There are several existing tools that will be considered and used during construction of the project's subsystems, include standard software versioning and package management tools such as UPS from FNAL and modules available at NERSC, standard source code repository tools such as git and Mercurial, and standard build tools such as cmake and gnumake."

What is the scope?



DES FACS Milestones

- 1: Specification document describing the system (configuration, algorithm interfaces, development practices, release management, etc.)
- 2: Provide a packaging and version solution, a code building solution, and the major driving framework using major APIs from the specification.
- 3: Porting of code into new framework APIs and development structure. Provide simple test suite that demonstrates a working system.
- 4: Document describing the results and how to use the new system.

The future

- Impact on LSST Level-3 Science Analysis Toolkit
  - Presented and discussed at the LSST DESC meeting in January
  - DES FACS usable in DESC context
  - Serves as excellent early example for the Toolkit
  - Helps develop good requirements and specifications for the Toolkit
- PDAC and use of Galaxy
  - Experience gained from this project can enhance DES FACS
  - Provides workflow and data sharing capabilities